



Castilleja linariifolia

Castilleja

Publication of the Wyoming Native Plant Society

Oct 2022, Volume 41(3)

Posted at www.wynps.org

America's Sagebrush Conservation and a Wyoming Sequel

The cover says it all: Wyoming is home to the largest intact stretch of remaining sagebrush ecosystem of all 13 western states, according to a multi-agency report that came out last month (Doherty et al. 2022), in the center of the ecosystem's distribution (Figure 1). In turn, this places sagebrush steppe conservation in Wyoming as integral to national sagebrush steppe conservation objectives.

The map on the document cover is not new but appeared very recently in a much-heralded U.S.G.S. publication on sagebrush ecosystem conservation (Remington et al. 2020; featured in *Castilleja* 40(3): 6.) The current report is its sequel – a framework for putting plans into action. Leading threats to the sagebrush ecosystem and the hundreds of species it supports include human modification to the landscape and incursion of invasive annual grasses and conifers (Doherty et al. 2022). Leading actions to avert those threats include protecting the least-damaged places, and then, where feasible, to restore degraded or destroyed areas (Doherty et al. 2022). The report also notes that climate may alter the risks of drought and fire.

The most recent document contains no state-level implementation information, and state agency comments were unavailable at the time of the publicized release of this publication. The current Wyoming plan for sage grouse habitat conservation pre-date these reports as a chapter in the State Wildlife Action Plan (SWAP; Wyoming

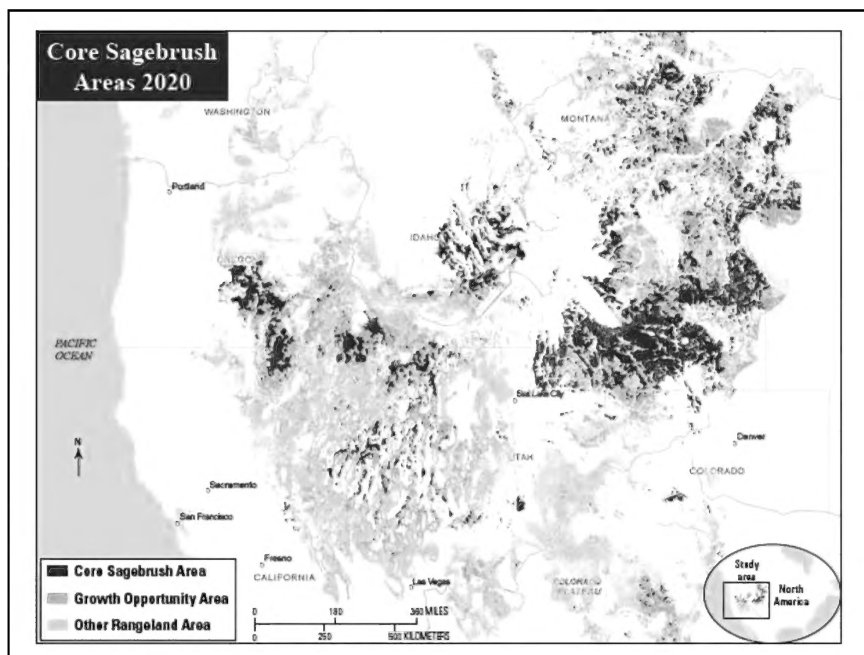


Figure 1. Core Sagebrush Areas; from the document cover of Doherty et al. (2022)

Game and Fish Department 2017) but address some of the same themes. A new SWAP plan is underway. bh

(Continued on p. 7 with the Literature Citations)

Articles are invited on what's happening to sagebrush habitat in Wyoming!

In this Issue:

America's Sagebrush Conservation	1,7
Beartooth Highway:	
A Route to Alpine Education?	3
New Wyoming Bryophyte Checklist	4
Recognizing Wyoming Diatoms	5
Ethnobotany – <i>Ligusticum porteri</i>	6

WYNPS News

Call for Nominations: Are YOU interested in being on the Board of Wyoming Native Plant Society? Nominations for 2023 are invited, and the ballot will appear in the next issue – please send your name to wynps@wynps.or or contact the Secretary-Treasurer.

WYNPS Board – 2022

President: Kristy Smith, Driggs, ID
(smith.kristy217@gmail.com)

Vice-President: Maggie Eshleman
(maggieeshleman@gmail.com)

Sec.-Treasurer: Dorothy Tuthill,
Laramie (dtuthill@uwyo.edu)

Board-at-large: Paige Wolken, Cheyenne
(paigewolken@yahoo.com) (2021-'22)

Greg Pappas, Laramie (gregory.pappas@usda.gov)
(2022-'23)

Other Contacts:

Editor: Bonnie Heidel (bheidel@uwyo.edu)

Webmaster: Maggie Eshleman
(maggieeshleman@gmail.com)

Sublette Chapter: Jill Randall, President
(possum1b@yahoo.com)

Teton Plants: Amy Taylor, Treasurer;
(tetonplants@gmail.com). Check the chapter
homepage (<https://tetonplants.org/>) for events.

Teton Plants is teaming with Bird and Nature Club to feature nature programs every second Tuesday of the month thanks to the co-sponsorship with the Teton County Library. Some programs will be zoom, others live, and next year there will be hybrid zoom/live programs. Check out the schedule at the Teton Plants homepage (above).

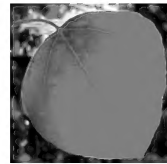
Social Media: We are on Facebook as Wyoming Native Plant Society and Instagram as @wyomingnativeplantsociety. Follow us on either platform for WYNPS updates and native plant content.

Treasurer's Report: Balance as of Oct 13:
Scholarship = \$1965; General = \$9,885; Total
= \$11,850.

Next issue: Please send articles and
announcements for the next newsletter by
15 Nov to:

Wyoming Native Plant Society
P.O. Box 2449
Laramie, WY 82073

New Members: Please welcome the following new members to WYNPS: Beverly Boynton, Kelly; Deborah Clemens, Jackson; Bethany Davidson, Buffalo; Janet Dibbs, Jackson; Sharon Felzer, Wilson; Katie Goidich, Rock Springs; Marla Kalal, Thermopolis; Kelsey Kehoe, Laramie; Julie Mclauren, Jackson; Amy Phillips, Meeteetse; Danita Sayers, Kirby; Chelsea-Victoria Turner, Sheridan.



Message from the President:

As the buzz of field season finally tapers to manageable levels, I find myself seeking out moments of quiet and calm in a landscape that is by now rapidly preparing for winter conditions. These moments allow me to reflect on the whirlwind summer WYNPS has had and the huge success of our Annual Meeting in Thermopolis.

This would not have been possible without the support of organizers, hike leaders, and WYNPS Board who helped with everything from last minute logistics to guiding entire groups of folks through plant families and specimen dissections. Additionally I'd like to thank Kimberly Bartlett and John Fenton for sharing their space with our campers over that weekend and providing support with getting food for the event, among many other things. I can't thank you all enough for your hard work and am honored to be a part of such a wonderful crew of natural enthusiasts.

We are thrilled to announce that our 2023 Annual Meeting will take place in Clark, WY from June 16th - 18th! We will be releasing more details about the Meeting in upcoming newsletter issues.

Thanks, and happy leaf peeping!

~Kristy Smith

Treasurer's Report: Balance as of Oct 13:
Scholarship = \$1,965; General = \$9,885; Total
= \$11,850.

Next issue: Please send articles and
announcements for the next newsletter by
15 Nov to:

Wyoming Native Plant Society
P.O. Box 2449
Laramie, WY 82073

Contributors to this Issue: Bonnie Heidel,
Meredith Taylor and Dorothy Tuthill.

Beartooth Highway: a Route to Alpine Education?



Left: The tooth-of-the-bear juts into the Beartooth skyline, visible from the Highway in Wyoming. From: www.yellowstonepark.com

The Beartooth Scenic Byway (U.S. Hwy. 212) is an alpine wonderland along highest segments of its 70-mile expanse, crossing Wyoming between Red Lodge, MT and Yellowstone National Park. In fact, it is the longest highway crossing alpine habitat in Wyoming. "Are we loving it to death?" asked Ann DeBolt, a botanist who visited the Beartooth Highway last year. She is a member of the Idaho and Montana native plant societies who saw firsthand the tundra damage and spoke-like patterns of trails radiating out from parking areas along the Beartooth Highway. Ann reached out to Wyoming and Montana Native Plant Societies about possible educational efforts in this heavily touristed landscape.

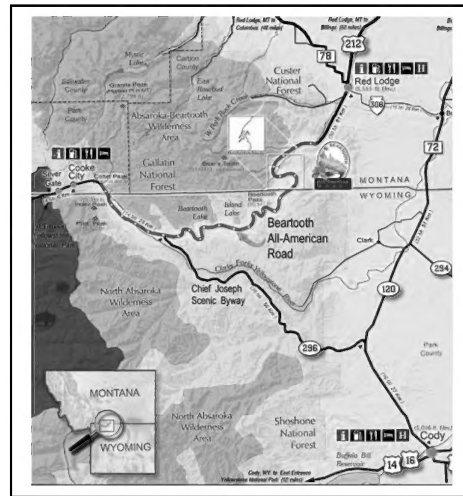
What is at stake? The alpine flora and alpine vistas are fundamental to scenic qualities of the Beartooth Highway experience, so discussions turned toward educational efforts that can have a focus as simple as highlighting the longevity of alpine plants and their short growing season, the elements of the alpine panorama, and appreciating them all.

The Highway ascends the Beartooth Plateau, an alpine peneplain that is hypothesized to have had areas of unglaciated refugia (Pierce 1979). Beartooth Pass reaches sky-high elevations nearing 11,000 ft, surrounded by glacial cirques, clear alpine lakes, perennial snowbeds, tundra expanses and wetlands. The entire alpine vegetation mosaic took thousands of years to form, supported by the amazingly thin cover of soil that can be seen along the roadside.

It has a spectacular array of alpine and montane plant communities designated within the Line Creek Plateau Research Natural Area (RNA) wrote Regional Forest Botanist, Steve Shelly (2003). The RNA, designated in 2000, is near the highway and straddles the state line, spanning 22,422 acres including the Twin Lakes area of Wyoming (Fertig and Bynum 1994) and larger areas of Montana (Lesica 1993), to protect alpine vegetation and rare plants near their southern limits in the Rockies.

In late June and July, the fragile tundra blossoms in a lavish display of wildflowers with flowering periods condensed into the short growing season. The brutal climate deters the growth of trees, and many of the plants that survive here grow at incredibly slow rates.

A nearby Global Observation Research Initiative in Alpine Environments (GLORIA) monitoring installation is one of many research sites in the Beartooth Plateau, and is part of an international long-term vegetation monitoring network. Below local peaks are high elevation peatlands, sites of the earliest documentation in the country, as conducted in the 1960s (Pierce 1961, Johnson and Billings 1962). Rare plant surveys along the Beartooth Highway right-of-way yielded the highest number of records among any highway surveys in Wyoming.



The Beartooth Highway also straddles two national forests, the Custer-Gallatin National Forest (Montana) and the Shoshone National Forest (Wyoming). So the two native plant societies are in early contacts with both national forests about public education opportunities.

...Stay tuned! bh

Literature Cited

- Fertig, W. and M. Bynum. Biological report on the proposed Twin Lakes Research Natural Area. Report prepared by WYNDD for Shoshone Natl Forest. 95 pp.
- Johnson, P. L. and W. D. Billings. 1962. The alpine vegetation of the Beartooth Plateau in relation to cryopedogenic processes and patterns. *Ecological Monographs* 32(2): 105-133.
- Lesica, P. 1993. Vegetation and flora of the Line Creek Plateau Area, Carbon County, Montana. Unpubl. report to U.S. Forest Service. Montana Natural Heritage Program. Helena, MT. 30 pp.
- Pierce, W. G. 1961. Permafrost and thaw depressions in a peat deposits in the Beartooth Mountains, northwestern Wyoming. U.S. Geol. Survey Prof. Paper 424B. Washington, D.C.
- Shelly, J. S. 2003. Line Creek Plateau Research Natural Area. *Kelsey* Summer issue.

New Wyoming Bryophyte Checklist

A new benchmark of Wyoming biodiversity by Yelena Kosovich-Anderson (2022) is now posted. It reports 481 bryophyte taxa documented for Wyoming, including 101 unique liverwort taxa and 380 unique mosses (the latter with 360 species, 2 subspecies and 18 varieties). This new checklist of Wyoming bryophytes is based on the author's extensive field research in Wyoming from 2003 through 2021 (Andrus & Kosovich-Anderson 2011; Kosovich-Anderson 2014, 2015, 2019, 2021, 2022; Kosovich-Anderson & Ignatov 2010; Kosovich-Anderson & Spence 2008; Kosovich-Anderson & Weber 2011, etc.), other literature resources, and data of the Consortium of North American Bryophyte Herbaria (2021).

The full citation and posting link for this new bryophyte checklist are:

Kosovich-Anderson, Y. I. 2022. A preliminary bryophyte checklist of Wyoming. Prepared for Wyoming Natural Diversity Database, Univ. of Wyoming. Cheyenne, WY. 39 pp. Posted at: <https://www.uwyo.edu/wyndd/files/docs/reports/WYNDDReports/22kos01.pdf>.

In spite of a long history of bryophyte collecting in Wyoming, going back to collections by Aven Nelson (1900), and a dissertation by C. L. Porter (1937), basic floristic information on the bryophytes of the state was scarce when the author began her research. Large portions of Wyoming remained unvisited by bryologists, the labels of many specimens were sketchy, and the liverworts were an especially under-documented segment of the Wyoming flora. Moreover, most of the previously collected material was scattered in herbaria all around the country, having been collected by researchers from different states.

Bryophytes (mosses, liverworts and hornworts) are nonvascular plants of generally small stature that play large biologically and potentially economically significant roles. Bryophytes assist in the stabilization of soil crust by colonizing bare ground and rock, and are essential in nutrient recycling, biomass production, and carbon fixing of ecosystems (Hallingbäck & Hodgetts 2000). They are integral to ecosystem structure and function at a microhabitat scale that can shape entire watershed properties, as a component of soil crust that contributes to water percolation and controls erosion in the western United States (Rosentreter et al. 2007), and as a mat-

forming surface across moist upland and wetland settings.

Wyoming can boast at least one endemic bryophyte, *Brachythecium erythrorrhizon* Bruch, Schimper & Gumbel var. *alpinum* Kosovich-Anderson & Ignatov, ... as documented by Kosovich-Anderson on the Beartooth Plateau! We look forward to learning more about Wyoming bryophytes from the author. bh

Literature Cited

- Andrus, R. E. & Y. I. Kosovich-Anderson. 2011. Two *Sphagnum* Sect. *Cuspidata*, new to the Western conterminous United States. *Evansia* 28 (2): 54-57.
- Consortium of North American Bryophyte Herbaria. 2021. Website: <http://bryophyteportal.org/portal/index.php> . [accessed 8 November 2021].
- Hallingbäck, T. & N. Hodgetts. 2000. Mosses, liverworts, and hornworts. Status survey and conservation action plan for bryophytes. IUCN/SSC Bryophyte Specialist Group. Cambridge.
- Kosovich-Anderson, Y. I. 2014. Modern herbarium resource for bryological studies in Wyoming. *The Jepson Globe* 24 (1): 9.
- Kosovich-Anderson, Y. I. 2015. Mosses of the Rocky Mountains in Wyoming, U.S.A.: new altitudinal records for North America. *Arctoa* 24: 141-147.
- Kosovich-Anderson, Y. I. 2019. Bryophyte inventory in Wyoming: 16 years of challenging efforts. *The Bryological Times* 148: 6-10.
- Kosovich-Anderson, Y. I. 2021. Bryoflora of the Shoshone National Forest, Wyoming. Part 1. A catalogue of mosses and liverworts of the Beartooth Plateau area. *Madrono* 68 (3): 283-335.
- Kosovich-Anderson, Y. I. 2022. A bryological survey in Dickinson Park, Wind River Range, Wyoming. *Evansia* 39 (1): 29-42.
- Kosovich-Anderson, Y. I. & M. S. Ignatov. 2010. Three interesting *Brachytheciaceae* mosses from the Beartooth Plateau (Rocky Mountains, Wyoming, U.S.A.). *Arctoa* 19: 183-190.
- Kosovich-Anderson, Y. I. & J. R. Spence. 2008. A remarkable new range extension of the subtropical *Brachymenium vinosulum* Cardot (Bryaceae). *Evansia* 25 (4): 90-93.
- Kosovich-Anderson, Y. I. & W. A. Weber. 2011. Mosses of the Wyoming's Beartooth Plateau: new noteworthy records for the Rocky Mountain region. *Phytoneuron* 2011-58: 1-10.
- Nelson, A. 1900. The Cryptogams of Wyoming. 10th Annual Report of the Wyoming Experiment Station. Laramie, Wyoming.
- Porter, C. L. 1937. The bryophytes of Wyoming. A thesis submitted for the degree of Doctor of Philosophy. University of Washington, Seattle, WA.
- Rosentreter R., M. Bowker & J. Belnap. 2007. A field guide to biological soil crusts of western U. S. drylands. U. S. Government Printing Office, Denver, Colorado.

Recognizing Wyoming Diatoms

Late last year, an illustrated volume of the diatom flora of Montana and adjacent states was published at the Academy of Natural Sciences of Philadelphia, ushering Montana and states like Wyoming into new realms of diatom documentation. It includes an atlas, catalogue and photographs of 841 species (Bahls 2021). It is the first volume of a two-volume set:

Bahls, L. 2021. Diatoms of Montana and western North America: Catalog and Atlas of species in the Montana Diatom Collection. Volume 1. The Academy of Natural Sciences of Philadelphia, Special Publication 24. Philadelphia, PA.

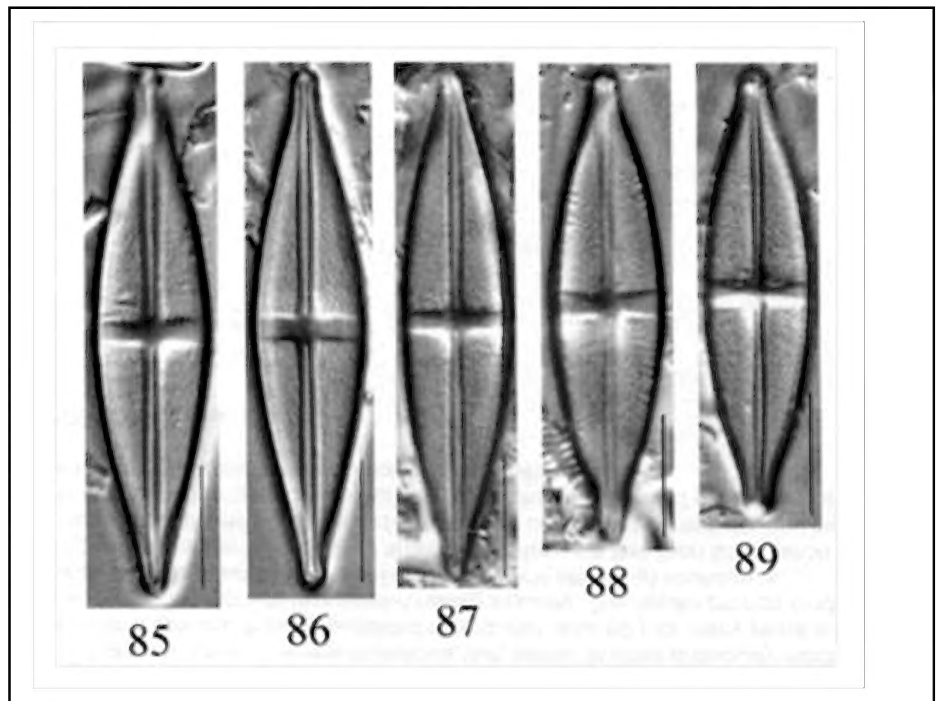
Diatoms (class Bacillariophyceae) are algae with architecture: unicellular planktonic plants or simple aggregations of cells that bioaccumulate silica. Their cell walls have a very intricate glass-like silica layer of symmetry and ornamentation sandwiched between two delicate organic membranes. They are widespread, occurring in fresh and marine waters, and anywhere there is moisture. Diatoms have an outside ecological importance as producers of oxygen (estimated to be about 20% of the oxygen produced on earth each year!), and as a primary food source in the food chain. They respond quickly to environmental change, and they are often used as bioindicators.

Over 200 plates of high-resolution photographs at 1500X fill the volume (no keys!) so that one might discern genera or add it to a coffee table collection of striking images. Each species is addressed with information on its habitat, ecology and distribution. Environmental profiles for over 300 of the most common species are presented with their abundance-weighted mean values of water chemistry, to put the diatomaceous flora that Bahls has fathomed for 50 years into ecological context.

Wyoming can boast at least one endemic diatom, *Stauroneis boyntoniae* Bahl, known only from the Wind River Range and named for its collector, Beverly

Boynton (Bahls 2010). Likewise, Wyoming can boast diatom aficionados... Boynton may be one of the few people in the state with a diatom emblazoned on her car as a special namesake, and she refers to diatoms as little glass ecological giants.

What does a diatom specimen look like? Permanent specimens are mounted and stained in slides, prepared for microscope viewing with basic collection information on file. The largest regional collection, with the highest number of Wyoming specimens, is in the Montana Diatom Collection (MDC) housed at the University of Montana Herbarium (MONTU) and at the Academy of Natural Sciences, Drexel University in Philadelphia (ANSP).



Above: *Stauroneis boyntoniae*, from Bahls (2010)

This publication does not provide checklists but is precursor of checklists. Bahls (2021) recommends the Diatoms of North America online flora (<https://diatoms.org/>) for anyone interested in taking a dip into diatoms. bh

Literature Cited

Bahls, L. 2010. *Stauroneis* in the Northern Rockies: 50 species of *Stauroneis* sensu stricto from western Montana, northern Idaho, northeastern Washington and southwestern Alberta, including 16 species described as new Northwest Diatoms, Volume 4. The Montana Diatom Collection, Helena, 172 pp.

Ethnobotany – Part 3. *Ligusticum porteri*

By Meredith Taylor



Above: *Ligusticum porteri* inflorescence, © Al Schneider,
<http://www.swcoloradowildflowers.com>

Osha, pronounced “Oh Shaw,” is a perennial herb that’s a member of the carrot and parsley family (Apiaceae). Also known as Bear root, Porter’s lovage, and Mountain lovage, Osha has traditionally been used in Native American, Latin American, and South American cultures for its purported medicinal benefits.

The species is described as: Dicotyledonous plant, approx. 0.5-1m tall, with dissected, parsley-like, mostly basal leaves. Leaflets are ovate to oblong or lanceolate. The small white flowers are grouped in a flattened compound umbel 6-7.5 cm (2.5-3 in) diam. Ribbed fruits are about 5 mm. Osha grows in subalpine conifer montane or meadow habitats in the Medicine Bow Range and Sierra Madre of Wyoming at the northern end of its distribution.

Alleged medicinal value of Osha is to treat respiratory conditions, according to Native American and Hispanic American cultures. Some native cultures consider Osha a sacred plant in addition to its medicinal and edible properties. It may be chewed or taken as a tea, tincture or decongestant for headaches, coughs, pneumonia, colds, bronchitis, and the flu, and is also considered an immune stimulant. An infusion of Osha in hot water may also be used to relieve indigestion, lung diseases, body aches, and sore throat. The green leaves may be soaked and cooked to be eaten as a healthy food.

Special caution should be taken to not confuse Osha with Water Hemlock (*Cicuta maculata*). The latter is highly poisonous and has a similar white umbel flower.

Although all parts of Osha are edible, the fibrous root is considered the most valuable part of the plant. Those harvesting Osha root should exhibit restraint and only dig a portion of the root up, so the plant may continue to grow. (Continued, next page)



Above: *Ligusticum porteri* whole plants, © Al Schneider,
<http://www.swcoloradowildflowers.com>

(Editor's note: This article is for educational purposes and does not condone collecting of plants that readers cannot identify with certainty. Ethical wild plant collecting follows practices that tread lightly. See an outline of those practices as posted in:

[Http://www.fs.usda.gov/Internet/FSE DOCUMENTS/s_telprd3822046.pdf](http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/s_telprd3822046.pdf) .

Check directly with the agency about their policies if you want to harvest native plants on public lands.

Literature Cited

Moerman, Daniel E., Native American Ethnobotany.
Copyright 1998 by Timber Press, Inc., Portland,
OR 97204.



Ligusticum porteri roots, by Meredith Taylor



Literature Cited - Continued from p. 1

Doherty, K., Theobald, D.M., Bradford, J.B., Wiechman, L.A., Bedrosian, G., Boyd, C.S., Cahill, M., Coates, P.S., Creutzburg, M.K., Crist, M.R., Finn, S.P., Kumar, A.V., Littlefield, C.E., Maestas, J.D., Prentice, K.L., Prochazka, B.G., Remington, T.E., Sparklin, W.D., Tull, J.C., Wurtzebach, Z., and Zeller, K.A., 2022, A sagebrush conservation design to proactively restore America's sagebrush biome: U.S. Geological Survey Open-File Report 2022-1081, 38 p., <https://doi.org/10.3133/ofr20221081> .

Remington, T.E., P.A. Deibert, S.E. Hanser, D.M. Davis, L.A. Robb and J.L. Welty. 2021. Sagebrush Conservation Strategy – Part 1. Challenges to Sagebrush Conservation. U.S. Geological Survey; Open-File Report 2020-1125. 327 pp. <https://pubs.usgs.gov/of/2020/1125/ofr20201125.pdf> . ISSN 0196-1497 (print); ISSN 2331-1258 (online).

Sagebrush Shrublands. In: State Wildlife Action Plan. 2017. Wyoming Game and Fish Department. Posted at: <https://wgfd.wyo.gov/WGFD/media/content/PDF/Habitat/SWAP/Terrestrial%20Habitat%20Types/Sagebrush-Shrublands.pdf> .

THE BEARTOOTH HIGHWAY - An All-American Road

Dubbed “the most beautiful roadway in America” by *On the Road* correspondent Charles Kuralt, the Beartooth Highway climbs to an astounding 10,947 feet above sea level. Since its completion in 1936, the Highway has awed millions of visitors with its astonishing views of one of the most rugged and wild areas in the lower 48 states.

[Posted by the Visitors Center of Red Lodge, Montana at: <https://www.redlodge.com/> .]

See page 3 to read about the Beartooth Highway as a route to alpine education.

WYOMING NATIVE PLANT SOCIETY MEMBERSHIP FORM

Date _____

Name _____

Address _____

Email _____

Please check all appropriate boxes:

- ☐ New member
- ☐ Renewing member
- ☐ Check here if this an address change
- ☐ Annual membership with email notification of newsletters: \$10
- ☐ Annual membership with mailed newsletters: \$12
- ☐ Annual membership with scholarship support and email notification of newsletters: \$20
- ☐ Annual membership with scholarship support and mailed newsletters: \$22
- ☐ Life membership with email notification of newsletters: \$300
- ☐ Life membership with mailed newsletters: \$300

In addition to the statewide organization, we have two chapters. Membership in chapters is optional; chapter members must also be members of the statewide organization.

- ☐ Teton Plants Chapter annual membership: \$5
- ☐ Sublette Chapter annual membership: \$5
- ☐ Additional donation of \$ _____

Total enclosed: _____

Please write checks to **Wyoming Native Plant Society**

Wyoming Native Plant Society
P.O. Box 2449
Laramie, WY 82073